tion, N. J., thunderstorms. Edinboro, Pa., thunderstorm; one person killed by lightning. Near Owensboro, Ky., windstorm. Van Wert, Ohio, thunderstorm; one person killed by lightning. Near Lanark and Bloomington, Ill., and Anderson, Ind., thunderstorms.

25th.—Plymouth, Mass., thunderstorm. Near West Simsbury, Conn., thunderstorm; stock killed by lightning. Dale Enterprise, Va., thunderstorm. Leonia, Miss., Sycamore, Paw Paw, and Hanover, Ill., Eagle, Wis., Palmyra, Steffenville, Arthur, and Kirksville, Mo., windstorms. Near Albany, Tex., thunderstorm; stock killed by lightning. Baird, Tex., thunderstorm; one person killed by lightning. Chattanooga, Tenn., Abilene and Clyde, Tex., Columbia, Mo., Marquette, Mich., Milwaukee, Wis., Keokuk, Grundy Center and Sioux City, Iowa, thunderstorms. Dedham, Iowa, thunderstorm; man killed by lightning.

26th.—Bemus Point, Lyons, Friendship, and Clyde, N. Y., thunderstorms. Le Roy, N. Y., thunderstorm; one person killed by lightning. Palmyra, N. Y., thunderstorm; stock killed by lightning. Edinboro, Pa., thunderstorm; man and stock killed by lightning. Albion and Springboro, Pa., hailstorms. Leechburg, Pa., thunderstorm; one person killed by lightning. Evans City, Pa., thunderstorm; five horses killed by lightning. Corry, Pa., Pushmataha, Ala., near Elon, Ark., Quincy, Ill., and Anderson, Ind., thunderstorms. Mount Sterling, Ky., thunderstorm; horse killed by lightning.

27th.—North Billerica, Mass., thunderstorm; two persons killed by lightning. Millville and Vineland, N. J., and York, Pa., thunderstorms. Spottsville, Va., thunderstorm; horse killed by lightning. Parkersburg, W. Va., rainstorm. Dresden, Kans., hailstorm.

28th.—Tewkesbury, Mass., thunderstorm; two persons killed by lightning.

29th.—Coeymans, N. Y., and Staunton, Va., hailstorms. Lambertville, N. J., thunderstorm. Abilene, Tex., rainstorm.

30th.—Millville, N. J., Louisburg, N. C., and Nashville, Tenn., thunderstorms. Pensacola, Fla., thunderstorm; three persons stunned by lightning. Leonia, Miss., windstorm.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere, as a whole, is very nearly constant from year to year, but the proportion received by the surface of the earth depends largely upon the absorption by the atmosphere, and varies with the distribution of cloudiness. The sunshine is now recorded automatically at 17 regular stations of the Weather Bureau by its photographic, and at 28 by its thermal effects. At three stations records are kept by both methods. The results are given in Table XI for each hour of local, not seventy-fifth meridian, time. The cloudiness is determined by numerous personal observations at all stations during the daytime, and is given in the column of "average cloudiness" in Table I; its complement or clear sky is given in the last column of Table XI.

COMPARISON OF SUNSHINE AND CLEAR SKY.

The sunshine registers give the *duration* of direct sunshine whence the percentage of possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. It should not be assumed that these numbers should agree, and for comparative purposes they have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental record of percentages of duration of sunshine is almost always larger than the observer's personal estimates of percentages of area of clear sky; the average excess for June, 1895, is 9 per cent for photographic records, and 14 per cent for thermometric records. The details are shown in the following table:

Difference between instrumental and personal observations of sunshine.

Photographic stations.	Instrumental.	Personal.	Difference.	Thermometric stations.	Instrumental.	Personal.	Difference.
Tucson, Ariz	88	73	15	Cincinnati, Ohio†	86	67	19
Salt Lake City, Utah†.	80	55	25	Chicago, Ill	83	70	13
Cleveland, Ohio	73	59	14	Columbus, Ohio	81	54	27
Portland, Oreg.†	73	56	17	Salt Lake City, Utah†.	81	55	26
Galveston, Tex.	72	67	5	Washington, D. C.	80	62	18
Santa Fe, N. Mex	71	58	13	Atlanta, Ga.	78	56	22
Savannah, Ga	70	62	8	Detroit, Mich.	77	65	12
Denver, Colo	68	50	18	Norfolk, Va	76	74	2
Dodge City, Kans.	65	57	8	Rochester, N. Y.	76	64	12
Memphis, Tenn.	63	62	1	Louisville, Ky	75	58	17
Helena, Mont.	59	54	5	Key West, Fla	73	54	19
San Diego, Cal.	59	64	— 5	St. Louis, Mo	72	49	23
Bismarck, N. Dak	57	44	13	San Francisco, Cal	70	69	1
Eastport, Me	48	34	14	Portland, Oreg.†	69	56	13
Cincinnati, Ohio†	.....	67	.....	Philadelphia, Pa	68	45	23
Kansas City, Mo.*	.....	.....	.....	Little Rock, Ark	65	42	23
Spokane, Wash.	.....	42	.....	New Haven, Conn.	64	58	6
				Seattle, Wash	64	50	14
				Marquette, Mich	63	38	25
				Portland, Me	62	33	29
				Baltimore, Md.	60	58	2
				Buffalo, N. Y.	60	49	11
				Des Moines, Iowa.	60	38	22
				Vicksburg, Miss	59	56	3
				Wilmington, N. C.	59	61	— 2
				Boston, Mass	56	47	9
				New York, N. Y	56	47	9
				New Orleans, La	50	50	0

* Record incomplete. † Records kept by both methods.

ATMOSPHERIC ELECTRICITY.

The statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month.

The dates on which reports of thunderstorms for the whole country were most numerous were: 12th, 221; 13th, 215; 24th, 283; 25th, 232; 26th, 235; 27th, 200.

Thunderstorm reports were most numerous in: Ohio, 190; Pennsylvania, 196; Colorado, 166; Iowa, 161; Louisiana, 153; Minnesota, 181; and Missouri, 260. The dates of occurrence of thunderstorms were most numerous in: Alabama, 26 days; Colorado, 26 days; Louisiana, 30; Minnesota, 28; Missouri, 26.

Severe thunderstorms are especially mentioned under "Local Storms."

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 2d to the 10th, inclusive. On the remaining twenty-one days of this month 55 reports were received, or an average of about two or three per day. The dates on which the reported number especially exceeded this average were the 6th and 9th.

Auroras were reported by a large percentage of observers in: Colorado, 16 per cent; New Hampshire, 50; North Dakota, 16.

The largest number of days on which auroras were reported in any State were: Minnesota and Washington, 7 days; New Hampshire, 9; North Dakota, 6.

DAMAGE BY LIGHTNING, JUNE, 1895.

The following statistics of the damage done by lightning, so far as reported by the observers of this Bureau, are furnished by Mr. Alexander McAdie: During June, 1895, 97 persons were killed and 89 severely injured; 14 empty and 50 full barns, 89 dwellings, and 15 churches were destroyed; 50 horses in stables and 45 in pasture were killed, The total estimated value of property destroyed was $85,200.

CANADIAN DATA—THUNDERSTORMS AND AURORAS.

Thunderstorms were reported as follows: Saint Andrews, 14. Father Point, 1, 11, 12, 21, 23, 29. Quebec, 13, 14, 21, 23,

29, 30. Montreal, 2, 5, 12, 13, 21, 22. Rockliffe, 14, 22, 26. Toronto, 4, 12, 13, 26. Port Stanley, 13, 24, 26, 28. Saugeen, 26. Parry Sound, 1, 12, 26. Port Arthur, 18, 29. Winnipeg, 15, 22, 24. Minnedosa, 25, 15, 16, 21, 23, 24, 28. Qu'Appelle, 12, 15, 22, 23, 24. Medicine Hat, 8, 11, 16, 18, 19, 20, 25, 30. Swift Current, 11, 18, 19, 20, 25. Calgary, 5, 17. Banff, 26. Prince Albert, 13, 22. Edmonton, 2, 15, 21, 23, 24.

Auroras were reported as follows: Father Point, 17, 18, 29. Quebec, 16, 17, 29. Montreal, 1, 6, 20. Rockliffe, 28. Winnipeg, 1, 13, 24, 28, 29. Minnedosa, 13, 17. Medicine Hat, 28, 29.

INLAND NAVIGATION.

The *extreme and average stages of water* in the rivers during the current month are given in Table VII, from which it appears that the only river that reached the danger line was the Willamette, which was highest on the 1st, after which it slowly fell to the end of the month, when it was 4 feet below the danger line. The stages of water in the Ohio and its tributaries have been so low as to seriously interfere with navigation.

METEOROLOGY AND MAGNETISM.

For general remarks relative to this subject see page 7 of the REVIEW for January, 1895.

The comparison of the air temperature with magnetic horizontal force is shown in detail on Chart V, and the special features of the June curves are as follows:

The corrections for slope to Salt Lake City group of temperatures is —1. For reduction to a zero base line the mean temperature variation is corrected by —3 and the magnetic force by —9. The pressures for June are set back one day as in April.

STATE WEATHER SERVICES.

The following notes are compiled from the reviews for June published by the services of the respective States:

Alabama.—The month opened quite warm, the temperature ranging as high as 100° in northeastern portions on the 2d, after which it steadily decreased and was generally slightly below the normal during the last half of the month. Rain was frequent and, as a rule, in heavy showers, confined mostly to the southwest, northwest, and west-central portions, though enough rain fell in the eastern portions. A number of heavy and damaging hailstorms occurred in central and northeast central portions on the 11th and 12th. The average temperature was 77.5°, or 0.3° less than the normal; the total rainfall was 5.45 inches, or 0.65 above normal.

Arizona.—The average temperature, 76°, was about 1° below the normal. The highest temperature reported was 100° at Yuma on the 23d, Peoria and Dudleyville on the 26th. The lowest, 31°, occurred on the 1st at Fort Apache. The average total rainfall was 0.11 of an inch, or 0.25 of an inch less than normal. Thunder was reported on the 5th, 7th, 8th, 23d, 27th, and 28th.

Arkansas.—The monthly mean temperature was 76.0°, or about normal. The first week was favorable for plant growth and the cultivation of all crops, but on the 8th general showers commenced and continued at short intervals during the ensuing twelve days, being very heavy in many localities on the 15th, 16th, 17th, and 18th; the month closed with another rainy period. These abundant rains prevented farmers from cleaning their crops, and in consequence grass and weeds made rapid growth. Cotton on lowlands was much damaged by water and grass; the plant was growing too rank and generally not fruiting well, and in some localities was drowned out. Much wheat and oats damaged by rain and harvesting delayed. The average precipitation for the State was 5.94 inches, 1.69 above normal. The rainfall was heaviest over the central and southeastern portions and lightest in the northeast portion. The greatest amount at any station was 13.06 inches at Madding, Jefferson County, and the least, 1.15 inch, at Osceola, Mississippi County.

California.—The average temperature was 70°, or 0.8° below the normal. The highest temperature reported was 123°, at Volcano Springs, on the 23d, and the lowest, 20°, at Bodie, on the 1st. The average precipitation was 0.01 of an inch, or 0.30 of an inch below normal. Thunder and lightning were reported at San Jacinto and Yreka on the 27th, and at Susanville on the 19th, 20th, and 24th.

Colorado.—The month was cooler than the average, the mean temperature being 59.4°, or nearly 3° less than the normal. The deficiency was most marked over the north-central section, the upper Arkansas Valley, and the western border counties. The highest temperatures were recorded generally on the 16th, 23d, and 24th; the maximum, 102°, occurring at Crook, Logan County, on the 24th; the lowest occurred principally on the 3d, 4th, and 18–19th, the minimum, 12°, being recorded at Breckinridge, Summit County, on the 5th. The average precipitation for the State was 2.39 inches, or twice the normal amount. Over the Divide and the north-central portion the rainfall was unusually heavy; an excess also occurred in the extreme northeastern, southeastern, and western border counties. Less than the normal amount was recorded in the upper Rio Grande Valley and the lower Arkansas basin, a decided deficiency being reported from Otero, Bent, and Prowers counties.

Connecticut.—(See *New England.*)

Delaware.—(See *Maryland.*)

Florida.—The average temperature was 79.8°, which is 0.6° below the normal. The highest daily, 99°, was reported from Clermont and Plant City on the 22d and from Earnestville on two or more dates, not specified. The lowest, 57°, occurred at Green Cove Springs and Plant City on the 20th. The average total precipitation, 4.46 inches, is 1.56 less than the normal. The greatest rainfall, 9.83 inches, was reported from Avon Park.

Georgia.—The month was not marked by any unusual weather conditions, but local thunderstorms were quite frequent, and in some localities property was destroyed by the high winds, and several persons either killed or injured by wind or lightning. The average temperature, 78°, varied but 0.1° from the normal. The average total rainfall, 3.91 inches, was, however, nearly one inch below the normal amount. The rains were generally local in their character and the monthly amount reported from Union Point, 8.88 inches, was the greatest and 1.52 inch from Milledgeville the least.

Idaho.—The month was characterized by very changeable weather over the greater portion of the State; it opened with showers, accompanied by unusually cold and disagreeable weather, which continued only a few days, the temperature gradually rising until the 5th, when another period of wet weather began and continued until the 8th. The rainfall during the remainder of the month was very light and poorly distributed, except over the northern half of the State, where showers were the rule from the 14th to the 17th. Severe frosts were reported in many localities, principally in the southern section, from the 8th to the 11th, and the 15th to the 18th, the latter period being the coldest of the month; the warmest period was from the 27th to 30th.

Illinois.—The mean for the month, 74.8°, was 3.8° above the normal temperature. Drought added severely to the great heat and caused vegetation to struggle for existence. Corn, a warm weather plant, did fairly well in most parts, but all other cultivated crops suffered severely. The heat wave continued with slight interruption until the 11th, and a second one began on the 16th and continued until the 25th; the remaining five days were comparatively cool. The highest temperature recorded during the month, 107°, occurred at Olney on the 3d. Only one cool wave of importance visited the State—that of the 5th and 6th—when the lowest temperatures were generally recorded; a very light frost occurred in a few north and northeast counties the same morning. A minimum temperature of 39° was reported for Wheaton on the 6th. The precipitation was generally deficient, that for the State as a whole showed a deficiency of 1.80 inch. The drought was severest in the northern section, where the deficiency of rainfall exceeded 2.50 inches. The thunderstorms of the 11th and 25th developed marked intensity; in many localities they bordered on the tornado and caused considerable damage to trees, buildings, and growing crops.

Indiana.—Continued warm, fair weather prevailed during the month, interrupted only on a very few days by showers. The mean temperature showed an excess above the normal everywhere, that for the State being 2.3°. The greatest excess occurred in the northern portion, where it reached 2.6°. Drought still continued at most stations, precipitation occurring only on a very few days; a few stations were relieved temporarily, but the rains, mostly in small amounts, were badly distributed. The average amount of precipitation for the State, 2.75 inches, was 1.26 inches less than normal. Thunderstorms formed on several days; most of them were moderate and of small extent; those of the 1st, 23d, and 25th were accompanied by hail at some stations. The dry, warm, fair weather was exceedingly favorable for harvesting; but all growing crops suffered more or less because of little or no rain.

Iowa.—The month was exceptionally favorable for all crops, except in some of the eastern counties, where the rainfall was far below the monthly average. In about five-sixths of the State the weather was generally all that could be desired. The mean temperature for the State was 69.7°, about 0.5° above the normal. The average rainfall was 4.32 inches, which is 0.63 of an inch below normal. Light frosts were